

2011 Resource Report for  
**Village of Northfield Electric Department**

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Submitted to:

the Public Service Board of the State of Vermont  
and  
the Department of Public Service of the State of Vermont

on  
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by  
the Vermont Public Power Supply Authority

on behalf of  
Village of Northfield Electric Department

in fulfillment of  
Vermont Public Service Board Rule 5.206

## 1) Executive Summary

The Village of Northfield Electric Department (Northfield) submits the following report to the Vermont Public Service Board and the Department of Public Service in compliance with Rule 5.206 (B), *Reporting Power Supply Transactions*. The information contained within this report summarizes Northfield's power supply needs and acquisition strategy. This report also summarizes resource transactions the utility expects to enter during the next 5 years.

Northfield relies on the Vermont Public Power Supply Authority (VPPSA) for its interactions with the ISO-NE and New England power markets. In addition to managing resources in the New England markets, VPPSA also explores new generation sources for its members. Examples of generation resources being reviewed include wind facilities in East Haven, VT, and Jacksonville, VT, hydroelectric and landfill methane resources in neighboring states, and proposals for new HQ and VY contracts. Additionally the 40MW peaking facility (Project 10) has synchronized to the ISO-NE grid and is commercially operational.

## 2) Utility Information

In 2010, Northfield's load requirements in the New England markets were 31,426,579 kWh. It reached a peak of 5,335 kw on 12/9/2010 at hour ending 18:00. Over the past several years, Northfield's load has fluctuated and is summarized in the following table.

Year	Load Obligation in New England Market (kwh)	Percent Increase (Decrease)
2006	30,431,986	
2007	31,105,015	2.16%
2008	31,184,520	0.25%
2009	30,502,095	-2.24%
2010	31,426,579	2.94%

Northfield's energy needs are projected into the future based on past load trends, weather, and known customer changes. Updated load forecast are completed regularly in an effort to refine Northfield's future energy need estimates. To follow is a summary of Northfield's forecasted energy requirements from 2011 to 2015.

Year	Load Obligation in New England Market (kwh)	Percent Increase (Decrease)
2011	30,066,189	-4.52%
2012	30,178,063	0.37%
2013	30,410,093	0.76%
2014	30,499,589	0.29%
2015	30,491,837	-0.03%

### **3) Market Conditions and New England Wholesale Price of Electricity**

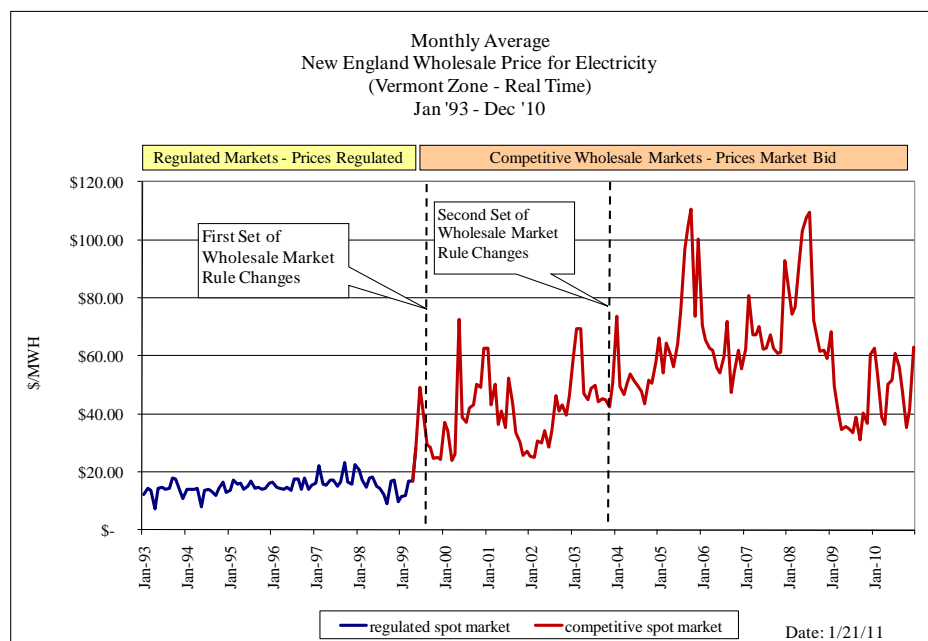
#### Wholesale Markets

Wholesale electricity costs have become extremely volatile with the advent of restructured wholesale energy markets. Changes to the power market in 1999 included implementation of competitive bidding practices for electric power plants in the New England system. Prior to 1999 power plant offers were fully regulated and required bidding based on fuel costs alone. In May, 1999 restrictions on power plant bid structure were lifted allowing submission of figures based on true total costs and market demand. Plants are selected to run in economic order from lowest bid to highest. Today competitive market forces set wholesale prices based on equilibrium between supply and demand.

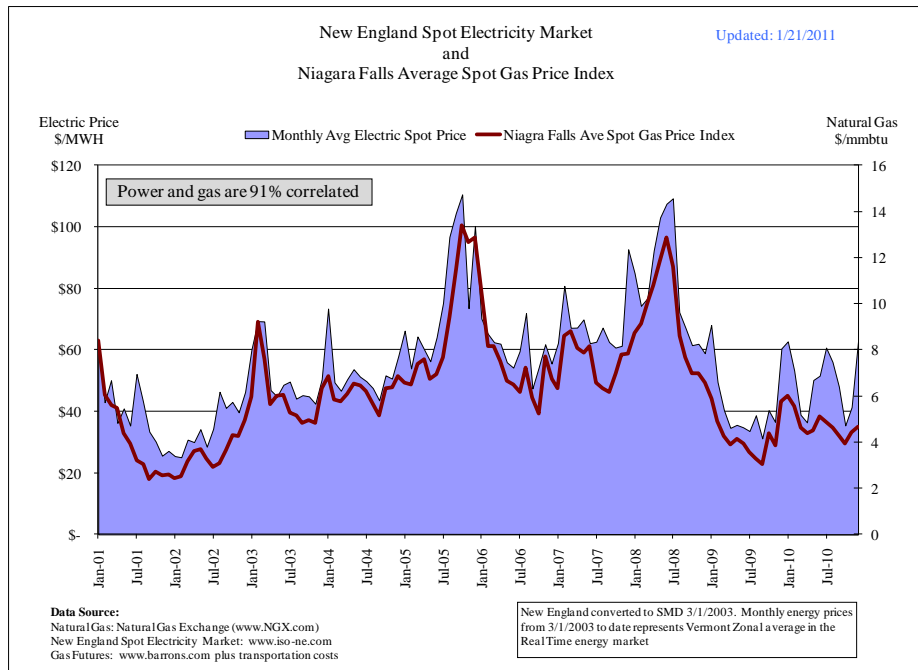
In March, 2003 additional changes occurred; these changes are referred to as "Standard Market Design." This set of rules established various clearing points on the New England transmission system ("grid") in order to send accurate price signals regarding supply and demand at different locations throughout Vermont and New

England. The system helps identify congested areas and spur infrastructure investment and demand side management.

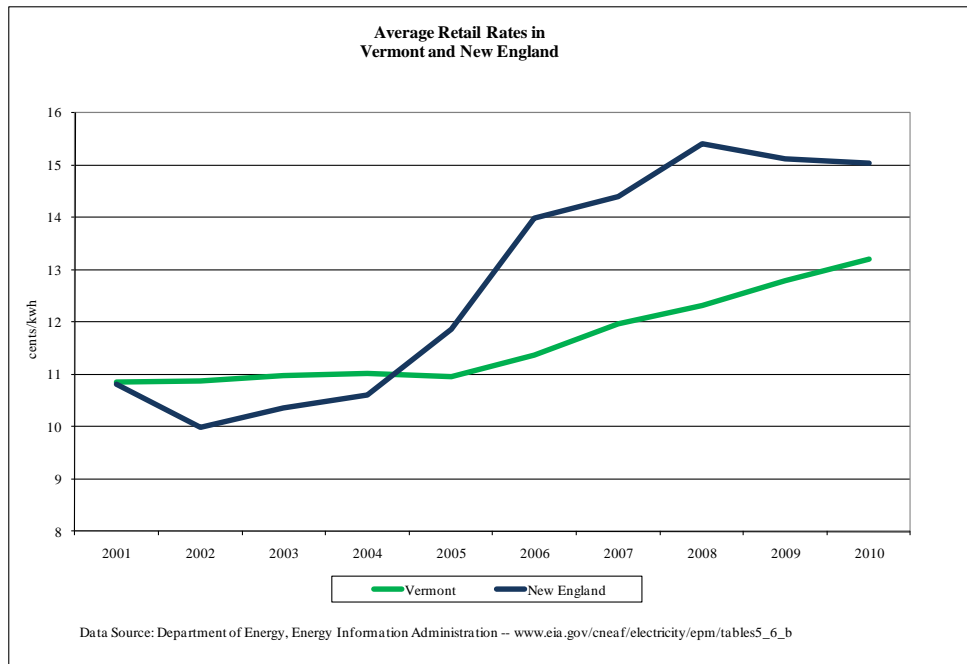
The following chart displays Vermont's real time wholesale monthly average energy costs over the last several years. Significant changes to market rules are identified by dashed vertical lines in the chart. After the implementation of new market rules wholesale power market prices have experienced both substantial rises and falls resulting in considerable volatility. This has produced instability and a lack of predictability in utility power portfolios and associated power costs.



The next chart shows the relationship between spot market electricity prices in New England and wholesale natural gas prices. Natural gas is considered the primary feedstock for electrical power generators in the New England market and as a result the relationship between the price of natural gas and electrical power is strong -- over the past ten years there has been a 91% correlation. During 2010 gas and electricity prices have remained relatively low due largely to increased supply of natural gas in U.S. markets and ongoing effects of global economic recession.



The following chart shows the average retail electric rates in Vermont compared to other New England states. On the aggregate level Vermont's rates are below average retail rates for the rest of New England. Among the reasons for the gap since 2004 is Vermont's decision not to deregulate its electric industry. Customers in Vermont receive significant portions of their power from long term stably priced contracts whereas customers in the rest of New England is more exposed to wholesale market price changes.



## 4) Existing Resources

Northfield's power supply portfolio is made up of generation resources, long-term contracts, and short-term contracts. The diversified portfolio acts as means to financially hedge the cost of serving load at the Vermont Zone in the ISO-NE market system.

Northfield's current supply mix is summarized in the following table, including a brief description of each resource.

Resource	2010 UCAP	2010 Kwh	Type	Description	Fuel	Location	Expiration
McNeil	1,051	5,395,131	On Peak	Wood Unit	Wood	Essex Node	Life of Unit
NYPA	259	1,514,981	ATC	Block Power	Hydro	Roseton Interface	Varies
VEPPI	332	1,815,505	ATC	PURPA Units	Wood/Hydro	Various VT nodes	Varies
Hydro Quebec	1,512	10,126,920	Dispatchable	Dispatched	Hydro	HQHighgate120	2012 - 2020
Market Contracts	N/A	9,400,396	Daily	ISO-NE bilateral	System Mix	Mass hub	Varies from 2009-2015

### McNeil

The McNeil wood-fired generating facility is located in Burlington, Vermont. The facility has a maximum generating capability of 54 MW. Northfield's entitlement to McNeil is provided through an agreement with the Vermont Public Power Supply Authority for the life of the power plant. Northfield expects the generation to be mostly composed of wood, but natural gas is used periodically as an alternate fuel source and for start up. Oil is also available and is used primarily as a start up fuel source.

### New York Power Authority (NYPA)

The New York Power Authority provides inexpensive, hydroelectric power to the utilities in Vermont under two contracts. The first contract is a 1,000 kW entitlement to the Robert Moses Project (a.k.a. "St. Lawrence") located in Massena, New York. The second contract, known as the "Niagara Contract," is for a 14,300 kW entitlement to the Niagara Project located at Niagara Falls, New York. The contract for St. Lawrence has been extended through April 30, 2017. The Niagara Contract has been extended through September 1, 2025.

### Vermont Electric Power Producers, Inc. (VEPPI)

Northfield receives power from several independent power projects (IPP) through a state mandated arrangement administered by the Rule 4.100 appointed purchasing agent. All current IPP generation resources in Vermont are hydro with one exception for a wood fired biomass generator. Vermont Electric Power Producers, Inc. (VEPPI) assigns power to all Vermont utilities under Vermont Public Service Board ("PSB") Rule 4.100 based on a pro-rata share of electric sales which is updated annually. Contracts between VEPPI and its constituent power producers began to terminate in 2008. The last VEPPI contract is scheduled to end in 2020.

### Hydro-Quebec/Vermont Joint Owners' (VJO) Contract

Northfield's entitlement in HQ/VJO contract is 1,512 kw. Northfield's entitlements are summarized as follows:

HQ Schedule	Entitlement (kW)	End Date
B	1198	2015
C1	246	2012
C2	66	2012
C3	2	2015

During the term of the contract the VJO were permitted to reduce/increase the annual capacity factor between 70% and 80% on five occasions. Hydro-Quebec was allowed to implement three reductions. The VJO and HQ have utilized all options to increase or decrease allowances of the HQ contract. HQ's annual energy deliveries are set at a 75% capacity factor starting in the contract year November 1, 2007 and will stay at that level for the remainder of the contract. Under the terms of the contract monthly capacity factors can range from 25% to 95%. However, in order to comply with ISO New England, Inc.'s Standard Market Design rules the monthly capacity factor, for practical purposes, cannot be less than 47%, on average.

#### Market Purchases

Northfield meets the remainder of its load obligations through ISO-NE's day-ahead and real-time energy markets, physical bilateral transactions and financial transactions. Northfield automatically participates in the wholesale markets through its ISO-NE settlement. Additionally short-term transactions are made periodically to adjust the portfolio in an effort to match resources to Northfield's load obligations. Market purchases range in size, duration, and by provider and can be transacted in small amounts. It should be noted that if purchases are longer than five years the transaction requires Vermont Public Service Board approval. At this time all market purchase contracts have been less than five years in duration.

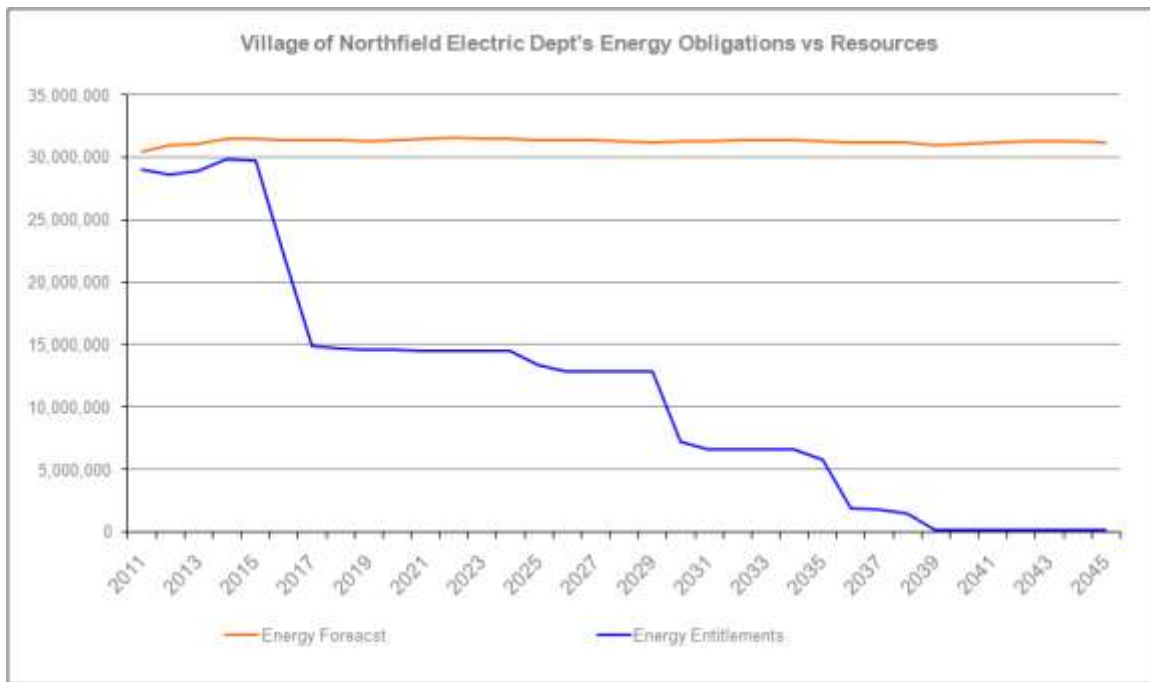
## **5) Market Position**

### Energy

Presented below is a graph of Northfield's projected energy resources, available from existing contracts and generating plants, from 2011 through 2045. On the same graph is a forecast of load that Northfield expects to serve over the same period. It



should be noted that energy is the largest component of a utility's power costs. Below the chart is a summary of major milestones that occur related to Northfield's sources of power.



#### Major Energy Milestones

- Market Contracts expiring in the first one to five years
- HQ C1 and HQ C2 expiring in 2012
- HQ B and HQ C3 expiring in 2015
- Entergy energy contract expired December 2010 - 752kW

Note the relationship between forecasted energy needs and Northfield's power supply resources. Gaps represent an under (or over) commitment of power resources as compared to projected load. As supply falls below load Northfield will acquire new resources that meet the utility's decision making criteria. A growing distance between the two lines is a normal part of the utility business as existing contracts expire over time. VPPSA continually evaluates power markets on Northfield's behalf for economical methods to address future energy needs.

## **6) Capacity Position**

### Capacity

Capacity is the second largest cost driver in a utility's power costs. Capacity represents the capability to generate electricity. In broad terms capacity is important in providing reliability and avoiding price spikes during peak demand periods.

The graph below shows the utility's capacity available from existing resources compared to its projected capacity requirements as a participant in ISO-NE wholesale markets.

Northfield voted to participate in the Swanton peaking facility (Project 10) which came into service in 2010. Northfield's capacity graph shows Northfield's capacity obligations and resources including the peaking facility. Below the chart is a summary of major milestones that occur related to Northfield's sources of power.

*(CAPACITY GRAPH HERE)*

#### Major Capacity Milestones

- Addition of Project 10 in 2010 - 4,701 kW
- HQ Schedules C1 and C2 expiring in 2012 - 312 kW
- HQ Schedule B expiring in 2015 - 1,198 kW

#### Forward Capacity Market

The Forward Capacity Market is a new market for capacity that began in June 2010. Northfield's generation will be credited at the auction clearing price for the commitment period. Conversely Northfield will be charged based on its load obligation coincident to New England's peak. Historically the price of capacity was set by a FERC approved agreement and ranged from \$3.05 per kW per month in December 2006 to \$4.10 by May 2010. After that time an auction process set the price. The first auction took place in February, 2008. The results from this auction set a new price for capacity for the period June, 2010 to May, 2011 (capacity cleared at \$4.50 kw-mo in the first auction). A second auction was held and set a new price for capacity for June, 2011 to May, 2012 (capacity cleared at \$3.60 kw-mo in the second auction). A third auction was held in October, 2009 for the period June, 2012 to May 2013 in which capacity cleared at \$2.95 kw-mo. The most recent auction was held in August, 2010 for the period June, 2013 to May, 2014 when capacity cleared at \$2.95 kw-mo.

## **7) Future Long-Term Resources**

### *Future Resources*

VPPSA assists Northfield in seeking resources to replace existing long-term resources. At this time VPPSA has negotiated for the purchase of output from several power projects that are in the planning and development stages as well as for other long term contractual opportunities. To follow is a summary of long term sources of power.

### *Project 10*

Northfield held a municipal vote to authorize the execution of a Power Sales Agreement (PSA) with the Vermont Public Power Supply Authority for 20040 of the output from a 40 MW peaking facility constructed in Swanton, Vermont. Eleven municipal utilities have signed Purchase Sales Agreements for the project which came online in 2010.

The project constructed 40 MW of peaking generating capacity. This generating capacity is designed to provide reliability services to the participating municipal utilities at prices below projected market prices for the Forward Capacity Market, Forward Reserve Markets, and Black Start. In addition, the units will run during peak price times to mitigate price spikes that occur when New England loads reach peak levels in the summer and winter. The Power Sales Agreement was filed with the Vermont PSB for Rule 5.200 notice in February, 2007.

### *Hydro Quebec*

Negotiations with Hydro Quebec began in early 2008 and have continued intermittently for a new contract to begin when the existing contracts with Vermont utilities start to expire. At this time Hydro Quebec has distributed a confidential offer to the Vermont Utilities. The Public Service Board has recently heard testimony on the contract. The goal of such long-term resource options is to reduce future price volatility and market uncertainty by reducing reliance on short duration market purchases.

#### Entergy/Vermont Yankee

Discussions are being held with the owner of the Vermont Yankee nuclear power plant (Entergy) and the state's two largest utilities for the ability to purchase power after 2012. VPPSA has received an offer from Entergy for a portion of the output from Vermont Yankee and is currently evaluating this resource.

#### East Mountain

VPPSA continues to explore the financial and practical feasibility of constructing a wind project on East Mountain in East Haven, Vermont. The estimated size of the project is between 8 and 12 MW.

#### Brockton Clean Power

VPPSA has been approached by developers of a large natural gas plant in Brockton, Massachusetts. Construction is scheduled to begin on the 350MW combined cycle plant in 2011. A relationship with this type of generator would help provide long term power supply predictability.

#### Ampersand Gilman Biomass

Discussions are being held with Ampersand Energy Partners for the output from a biomass plant at the former Gilman Mill site in Gilman, Vermont. The project is scheduled to replace an existing biomass generator with a larger, more efficient unit. Total output from the new generator is expected to be between 8 and 16 MW. There is additional hydroelectric generation onsite which may play an additional role.

#### Messalonskee Hydro

Negotiations are underway with for the purchase of power output from hydroelectric generators on the Messalonskee Stream. The Messalonskee Stream is a tributary of Kennebec River in Kennebec County, Maine and contains three generating facilities along the stream. Impounding facilities above the upstream-most generator enhance the ability of the three generators to provide more consistent and more reliable generating ability.

### Fitchburg Landfill Methane

Negotiations are underway for the purchase of power output from an existing landfill methane generator at the Fitchburg Solid Waste facility in Westminister, Massachusetts. This project would provide reliable, renewable energy.

## **8) Anticipated Resource Transactions**

### Planned Purchasing

In order to make its members' power costs more predictable, VPPSA implemented a plan to purchase power using a systematic power purchasing technique. In order to avoid uncertainty and volatile swings of frequent market purchases, Northfield currently participates in the Planned Purchasing structure through its membership in the Vermont Public Power Supply Authority. Under the Planned Purchasing approach, VPPSA reviews Northfield's future market exposure (defined as its forecasted need for power, less amounts available through previously secured long-term contracts and generation) every six months.

Twice a year, in the spring and fall, Northfield has the opportunity to purchase a portion of its energy needs for future periods. By staggering the purchases, at any given point the market needs of Northfield are met by contracts purchased at different times resulting in less volatile power market prices. This is very similar to the concept of dollar cost averaging which is used in investing. As a result from contracting in even intervals Northfield's outstanding power portfolio needs are filled with a laddering effect. Contracts are small and layered at different intervals of time. This approach is beneficial because the utility will not have large breaks in coverage in the future.

The implementation of Planned Purchasing is structured and systematic but it does not remove the need for continual market monitoring and judgment. The goal is to use market monitoring and judgment to give the municipal systems the benefit of more favorable resource prices. In the event that market prices are below prices that will cause rates to be stable additional or longer purchase may be made instead of the normal duration. In the event that unusually high prices prevail at the time of a planned purchase

the purchase may be delayed. In general this approach deters attempts to ‘time the market.’

The following table is a summary of anticipated resource transactions for 2011 through 2015:

Transaction	Volume	Term	Product	Explanation
McNeil Outage	0-1 mW	Up to 1 month	Energy	Purchases and/or sales to hedge load exposure during maintenance outage at prevailing market prices
HQ Outage	0-2 mW	Up to 1 month	Energy	Purchases and/or sales to hedge load exposure during Highgate Converter outage at prevailing market prices
Daily Transactions	0-3 mW	1-3 Days	Energy	Optimizing / hedging purchases and/or sales at prevailing market prices
Weekly Transactions	0-3 mW	1-2 Weeks	Energy	Optimizing / hedging purchases and/or sales at prevailing market prices
Monthly / Season Transactions	0-3 mW	1-3 Months	Energy	Optimizing / hedging purchases and/or sales at prevailing market prices
Planned Purchasing	0-3 mW	2-5 Years	Base Load Energy	Prevailing market price purchases and/or sales to hedge long-term energy needs not met by long term resources
Planned Purchasing	0-3 mW	2-5 Years	Peak Period Energy	Prevailing market price purchases and/or sales to hedge long-term energy needs not met by long term resources
Financial Transmission Rights	0-6 mW	Monthly and one year	FTR	Purchases and/or sales of FTR's to minimize congestion exposure or provide revenues to offset congestion charges
Capacity	Excess or short position	Monthly	Capacity	Excess or deficient capacity obligations will be settled at FCM transition price
Phase 1	0-2 mW	Up to 1 Year	Transmission	Short-term purchases and/or sales of unused transmission space to reduce costs
Renewable Energy Credits	Variable	Up to 5 Years	REC's	Purchases and/or sales of Renewable Energy Credits (RECs) to minimize generation costs
Financial Options	See Above	See Above	See Above	Financial options may be substituted for any of the above physical products

